Remarks

Claims 26-44 are pending in the application. Favorable reconsideration and allowance of this application is respectfully requested in light of the remarks that follow.

The Examiner rejected claims 26, 27 and 31-36 under 35 U.S.C. §103 in view of *Horrocks et al.* in further view of admitted prior art or *Wipf et al*, and claims 28-30 and 37-42 under 35 U.S.C. §103 in view of these references and further in view of *Kwak et al.* In particular, the Examiner indicated that *Horrocks et al.* disclose a scanning electrochemical potential microscope. The Applicant respectfully disagrees with this and the remaining paragraphs for the following reasons.

In the present application, Applicant claims a scanning electrochemical potential microscope that measures potential across a potential gradient between a probe and a sample with the probe positioned in the electrical double layer on a surface of the sample, as specifically claimed. Moreover, the microscope, as defined in claim 29, for example, is limited to using the measured potential across the gradient as a control parameter (e.g., in a feedback loop to control tip-sample separation).

In view of the Examiner's arguments, repeated once again, there seems to be a fundamental misunderstanding of the present invention, as defined in the claims. First, the Examiner continues to contend that defining the position/orientation of structure is somehow only a statement of intended use rather than an actual limitation. Yet, it is undeniable that limiting structure to a specific position/orientation defines a limitation of the claims. In this

case, the tip of the probe of the microscope defined, for example, in claim 26 is positioned in the electrical double layer, a feature that is not taught by the cited art, as discussed in further detail below.

The references cited by the Examiner and directed to SECM do not disclose the features of the claimed invention, SEPM. First, SECM, as disclosed in *Horrocks et al.*, is used to measure changes in current caused by electrochemical reactions at the tip of the probe as the probe scans a sample, rather than potential or changes in potential.

In addition, not only do the cited SECM references not teach positioning a tip in the electrical double layer (as defined in the claims), SECM cannot be used to position the tip at the electrical double layer. Given that this point may not have been made as clearly as possible in applicant's September 26, 2005, Reply, applicant provides the following background. Most generally, SECM, as disclosed in *Horrocks et al.* or *Wipf et al.*, measures current and that measured current can be used to control tip-sample separation (i.e., "feel" for the surface) and detect sample properties. In this regard, as tip-sample spacing approaches the stated range of the electrical double layer, SECM is unable to measure any current (described further below). As a result, SECM is not able to control movement of a probe in the range of the electrical double layer, i.e., within 10 or 20 nm of the sample surface.

The reason that SECM cannot measure currents at the electrical double layer is made apparent by analyzing the type of current being measured using SECM and the type of tip required to measure that current. In this regard, the Examiner is correct in saying that the

SECM tip of *Wipf et al.* has a 10 micron wide wire and has 10-20 times that in insulating material, admittedly a needed component of the SECM tip for performing its electrochemical current measurements. The bottom of this SECM tip is flat with an approximate 10 micron circle in the center that is conducting. In this case, as tip-sample separation is reduced, the current that flows due to electrochemical reactions is measured by the SECM. This current becomes less and less until it becomes basically undetectable at about 50 nm of tip-sample separation. With no ability to detect current at tip-sample separations less than 50 nm, the tip cannot be controlled as it approaches the sample surface. This phenomenon is further highlighted by Figure 6 of *Wipf et al.*, which shows that the current drastically falls off at about 0.5 micron. Because it is this current that is being measured and used to control tip-sample separation, SECM is unable to position the tip in the electrical double layer. This, of course, is independent of whether the SECM tip could <u>theoretically</u> be put at that range with the disclosed actuator. Stated another way, independent of whether the associated actuator used in SECM is theoretically able to place the tip at the range of an electrical double layer, there is no way to control the spacing precisely because corresponding changes in current, which again are monitored in SECM to determine tip-sample spacing, are immeasurable. Therefore, the SECM references cited by the Examiner clearly do not teach all of the limitations of the claims.

Note that applicant acknowledges that it is not claiming tip size. Applicant is only commenting on the tip size and capabilities with respect to placing the tip at a certain range to show that the cited technique (SECM) cannot teach one of the limitations defined in the claims.

It is immaterial that readily available actuators were precise enough to move a tip into that range because SECM cannot provide the control needed to place the tip at the claimed range.

Moreover, by requiring such a large tip to measure current, the ability to measure potentials across a potential gradient between the tip and sample is very limited, even if SECM were used to do so (a feature that the applicant clearly does not admit is disclosed in the SECM references). Resolution would be so low that the data would not be useful. Applicant also acknowledges that the present specification suggests that SECM could make measurements at tip-sample spacings as little as 1 nm. Although this theoretically could be the case (for example, if the limitations of the technology were refined), in practical terms, it just is not possible for the reasons stated above. Importantly, even the Examiner notes a few lines down in paragraph "4" of the Office Action that *Wipf et al.* discloses that a tip-sample spacing as low as 0.5 μm is achievable, . Clearly, as even suggested in the Office Action, SECM is capable of taking current measurements at a tip-sample range of about 500 nm.

In view of the above, the cited references do not teach all the limitations of claims 26, 27 and 31-36. As a result, the Examiner's rejections in this regard are believed to be obviated and an indication to that effect is respectfully requested.

Turning to claims 28-30 and 37-42, the additional reference, *Kwak et al.* (US Pat. No. 5,202,004), is similarly an SECM reference that does not teach the limitations of the rejected claims. In particular, the Examiner contends that *Kwak et al.* disclose using an SECM to control a piezoelectric actuator using potential across the potential gradient between the tip and

sample as a control parameter. Again, SECM measures current to make its measurement. *Kwak et al.* discloses measuring a potential, but its not the potential defined in the claims and it is for an entirely different purpose. *Kwak et al.* discloses measuring the voltage between a working electrode and a reference electrode, structure used to create the electrochemical reaction of SECM. *Kwak et al.* teach neither a) measuring potential across a potential gradient between the probe and sample when the probe is in the electrical double layer, nor b) using potential as a control parameter in a feedback loop, as defined. Therefore, *Kwak et al.*, similar to the remaining SECM references, does not disclose all the limitations of the rejected claims. The same applies to *Horrocks et al.* Contrary to the Examiner's contention in paragraph 19 of the Action, *Horrocks et al.* disclose SECM that is based on measuring current, not potential across the defined gradient.

The Examiner notes that *Kwak et al.* teach a number of modes for operating an SECM "including a mode where the measured signal is relied on to control the tip-sample separation such that the contours of the sample surface can be monitored and followed." Applicant does not disagree. However, *Kwak et al.*, provides no disclosure regarding using a measured potential across the stated gradient as a feedback parameter to control tip-sample separation. As such, the cited references do not disclose each and every limitation of the rejected claims, and thus these rejections are believed to be obviated. An indication to that effect is respectfully requested.

Conclusion

In view of the above Remarks, independent claims 26 and 37, as well as their corresponding dependent claims 27-36 and 38-42, are believed to be in compliance with 35 U.S.C. §§ 102, 103 and 112. As such, an indication to that effect as well as a Notice of Allowance is respectfully requested. Should the Examiner have any further questions that could expedite the resolution of this application, the Examiner is invited to contact the undersigned at the below number.

Applicant respectfully requests an extension of time to March 17, 2006, to file this Reply. A check in the amount of **$120.00** is included. No other fees are believed to be payable in connection with this Reply. Nevertheless, should the Examiner consider any fee to be payable in conjunction with this or any future communication, the Director is authorized to direct payment of such fees, or credit any overpayments to Deposit Account No. 50-1170.

Respectfully submitted,

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Customer Account No.: 23598

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